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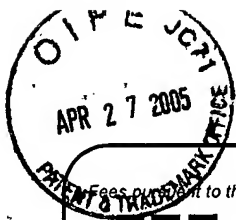
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PTO/SB/21 (09-04)

PRIORITY MAIL TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	10/797,650
	Filing Date	March 9, 2004
	First Named Inventor	TOMITA, Aki
	Art Unit	2181
	Examiner Name	Unassigned
	Attorney Docket Number	16869K-109000US
Total Number of Pages in This Submission	15	

ENCLOSURES (Check all that apply)				
<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input checked="" type="checkbox"/> Petition to Make Special <input checked="" type="checkbox"/> Preliminary Amendment <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Five (5) Cited References Return Postcard		
<table border="1"><tr><td>Remarks</td><td>The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.</td></tr></table>			Remarks	The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.
Remarks	The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.			
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT				
Firm Name	Townsend and Townsend and Crew LLP			
Signature				
Printed name	Chun-Pok Leung			
Date	April 27, 2005	Reg. No. 41,405		

CERTIFICATE OF TRANSMISSION/MAILING			
Express Mail Label: EV 529870055 US			
I hereby certify that this correspondence is being deposited with the United States Postal Service with "Express Mail Post Office to Address" service under 37 CFR 1.10 on this date April 27, 2005 and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.			
Signature			
Typed or printed name	Christina Mendoza	Date	April 27, 2005



Effective on 12/08/2004.

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL

For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ 130)

Complete if Known

Application Number	10/797,650
Filing Date	March 9, 2004
First Named Inventor	TOMITA, Aki
Examiner Name	Unassigned
Art Unit	2181
Attorney Docket No.	16869K-109000US

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____
☒ Deposit Account Deposit Account Number: 20-1430 Deposit Account Name: Townsend and Townsend and Crew LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee
☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

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FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Small Entity	Fee (\$)	Small Entity	Fee (\$)	Small Entity	Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Small Entity	
	Fee (\$)	Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims Extra Claims Fee (\$) Fee Paid (\$) Multiple Dependent Claims
-20 or HP = _____ x _____ = _____ Fee (\$) Fee Paid (\$)

HP = highest number of total claims paid for, if greater than 20

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)
-3 or HP = _____ x _____ = _____

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)
- 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other: Petition to Make Special for New Application Under M.P.E.P 708.02
VIII & 37 C.F.R. 1.102 (d)

Fees Paid (\$)

130

SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 41,405	Telephone 650-326-2400
Name (Print/Type)	Chun-Pok Leung		Date April 27, 2005



PATENT
Attorney Docket No.: 16869K-109000US
Client Ref.: 704/SM/toh

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

AKI TOMITA

Application No.: 10/797,650

Filed: March 9, 2004

For: DATA I/O SYSTEM USING A
PLURALITY OF MIRROR
VOLUMES

Customer No.: 20350

Examiner: Unassigned

Technology Center/Art Unit: 2181

Confirmation No.: 4199

**PETITION TO MAKE SPECIAL FOR
NEW APPLICATION UNDER M.P.E.P.
§ 708.02, VIII & 37 C.F.R. § 1.102(d)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

April 27, 2005

Sir:

This is a petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner is authorized to charge the petition fee of \$130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicant will make an election without traverse as a prerequisite to the grant of special status.

(c) Pre-examination searches were made of U.S. issued patents, including a classification search and a key word search. The classification search was conducted on or around April 12, 2005 covering Class 710 (subclass 5), Class 711 (subclasses 161 and 162), and Class 714 (subclasses 1, 2, 5, and 6), by a professional search firm, Lacasse & Associates, LLC. The key word search was performed on the USPTO full-text database including published U.S. patent applications. The inventors further provided a reference considered most closely related to the subject matter of the

present application (see reference #5 below), which was cited in the Information Disclosure Statement filed with the application on March 9, 2004.

(d) The following references, copies of which are attached herewith, are deemed most closely related to the subject matter encompassed by the claims:

- (1) U.S. Patent No. 6,820,180 B2;
- (2) U.S. Patent Publication No. 2003/0126388 A1;
- (3) U.S. Patent Publication No. 2004/0230859 A1;
- (4) U.S. Patent Publication No. 2005/0034013 A1; and
- (5) U.S. Patent No. 6,101,497.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to a data I/O technology to ensure availability of a secondary mirror volume in which a copy of data of a primary volume is written.

Independent claim 1 recites a data I/O system comprising a plurality of storage devices; and a controller which controls the storage devices. The controller includes a read/write unit, responsive to the subsequent receipt of a read request and a write request, for reading data stored in the storage devices and writing data in the storage devices; a logical volume management unit configured to map between a logical image of the data storage of a host processor (logical volume) and an actual space in the storage devices; a volume management unit configured to manage an active primary production volume (P-VOL) and second multiple mirror volumes (S-VOL) created as mirror images of the primary volume; and an S-VOL restoring unit configured to restore the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL.

Independent claim 12 recites a method of controlling a data I/O system which includes a plurality of storage devices; a read/write unit, responsive to the subsequent receipt of a read request and a write request, for reading data stored in the storage devices and writing data in the storage devices; and a logical volume management unit configured to map between a logical image of the data storage of a host processor (logical volume) and an actual space in the storage devices. The

method comprises managing an active primary production volume (PVOL) and second multiple mirror volumes (S-VOL) created as mirror images of the primary volume; and restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL.

One of the benefits that may be derived is that the availability of secondary mirror volumes (S-VOLs) can be ensured.

B. Discussion of the References

1. U.S. Patent No. 6,820,180 B2

The patent to McBrearty et al. (6,820,180 B2), assigned to International Business Machines Corporation, provides for an Apparatus and Method of Cascading Backup Logical Volume Mirrors. Discussed are library subroutines and other tools that allow a user to establish and control logical volume storage. The LVM controls physical storage system resources by mapping data between logical view of storage space and actual physical storage system. When an application program sends commands to file system manager 402 to store or retrieve data from logical volume 412, file system 402 informs the logical volume manager 412 of the application program's wish. When a system administrator wants to mirror a piece of data, the administrator has to devise a map, which may be stored in the LVM. Shown in figure 11 appears to be a process that may be used to synchronize one mirror to another mirror. Data is read from the mirror to which the other mirror is to be synchronized and written into the mirror being synchronized. See Figures 4 and 5; column 5, line 66 to column 6, line 6; column 6, lines 19-27; and column 8, lines 64-67.

This reference relates to cascading backup mirrors in which a mirror map having at least three mirrors is created. It does not teach restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL, as recited in independent claims 1 and 12.

2. U.S. Patent Publication No. 2003/0126388 A1

The patent application publication to Yamagami (2003/0126388 A1), assigned to Hitachi, Ltd., provides for a Method and Apparatus for Managing Storage Based Replication. Discussed is a new mirror 130b, which comprises of volumes 106a and 106b, and is created without copying data from volume 106a to volume 106b. Volumes 105a and 106a, and 105b and 106b appear to contain the same data after processing. Shown in figure 6 is a copy management table of a remote mirror 130a, including volumes 105a and 105b. A production host 110a appears to be connected with

primary storage system 100a and appears to write production level data to volume 105a and read data there from. See paragraphs [0050], [0053], and [0057].

This reference relates to managing storage based replication by making multiple remote copies of information without the necessity of copying information for each pair. It does not teach mapping between a logical image of the data storage of a host processor and an actual space in the storage devices, or restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL, as recited in independent claims 1 and 12.

3. U.S. Patent Publication No. 2004/0230859 A1

The patent application publication to Cochran et al. (2004/0230859 A1), assigned to Hewlett-Packard Development Company, L.P., provides for a Disaster Recovery System with Cascaded Resynchronization. Shown in figure 10A appears to be a synchronous data replication method, in which a main control unit appears to perform a write operation on a primary volume, and then start an update copy operation on a secondary volume. Shown in figure 6 appears to be an example of disaster recovery system 500 including sequenced cascaded resynchronization. A second disk array 620 appears to comprise a remote mirror secondary volume and local mirror primary volume storage 622 linked to the remote mirror primary volume storage 612 by a first communication link. Disk array 620 may also comprise a local mirror secondary volume and remote mirror primary volume storage 624 internally mirror linked to the remote mirror secondary volume and local mirror primary volume storage 622. See paragraphs [0041] and [0050].

This reference relates to a disaster recovery system with sequenced cascaded resynchronization in which the distributed control system is capable of coordinating operations via the communication interfaces of the plurality of data centers to resynchronize a plurality of communication links between data center pairs and the plurality of data centers. It does not teach mapping between a logical image of the data storage of a host processor and an actual space in storage devices, or restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL, as recited in independent claims 1 and 12.

4. U.S. Patent Publication No. 2005/0034013 A1

The patent application publication to Yamamoto et al. (2005/0034013 A1), assigned to Hitachi America, Ltd., provides for a Method and Apparatus for the Takeover of Primary Volume in Multiple Volume Mirroring. Discussed are host systems 020000 which appear to read and write data to a disk system 010000. Software running on data processing unit 012100 appears to create

logical volumes, comprising portions of the physical disk drives in a data integrity disk group. When a multiple mirror function is used in a disk group, it appears that there is established an LDEV mirroring group which identifies those logical volumes which participate in data mirroring. A mirroring group may include one primary LDEV and one or more secondary LDEVs. Data written to the primary volume appears to be mirrored in the secondary volumes. See Figure 1; and paragraphs [0025], [0030], and [0034].

This reference relates to a technique for the takeover of primary volume in multiple volume mirroring in which the data is consulted to select a secondary volume when the disk group containing a primary volume fails. It does not teach restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL, as recited in independent claims 1 and 12.

5. U.S. Patent No. 6,101,497

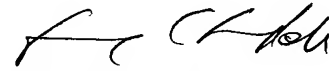
The reference discloses a method and an apparatus for independent and simultaneous access to a common data set. A first data processing system with a first data facility stores a database and processes transactions or other priority applications. A second data storage facility, which may be physically separated from the first data storage facility, mirrors the data in the first data storage facility. In a concurrent access operating mode, the second data storage facility makes the data available to an application concurrently with, but independently of, the operation of the other application. On completion of the concurrent operation, the second data storage facility can reconnect with and synchronize with the first data storage facility to reestablish the mirroring operation.

As discussed in the present application at page 1, line 24 to page 2, line 8, this reference is an example of recent storage systems that have adopted various technologies to improve the availability of the main transaction processing, such as a mechanism to backup data and a mechanism (replication) to copy data for data analysis or development/testing with no impact on main transaction processing. In such replication, data stored in a volume (primary volume) applied to main transaction processing is copied to another volume (secondary mirror volume), and this secondary mirror volume is used in various secondary transaction processing such as data backup, data analysis, and development/testing. While the replication technology can basically improve the availability of the primary volume used in the main transaction processing, it does not take into consideration the availability of secondary mirror volume.

This reference does not teach restoring the data of a first S-VOL with the data of a second S-VOL depending on the type of an error that happens in the first S-VOL, as recited in independent claims 1 and 12.

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



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60475703 v1